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10/612,889	07/03/2003	Harish R. Devanagondi	23019-07337	7012

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EXAMINER	
WU, JIANYE	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/612,889	DEVANAGONDI ET AL.	
	Examiner	Art Unit	
	Jianye Wu	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-21 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 03 July 2003 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

> 1. Determining the scope and contents of the prior art.
> 2. Ascertaining the differences between the prior art and the claims at issue.
> 3. Resolving the level of ordinary skill in the pertinent art.
> 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. **Claims 1-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakayama et al. (US 6907001 B1, hereinafter **Nakayama**) in view of Rosen, IETF RFC 3031, "MPLS Architecture", January, 2001 (hereinafter **RFC3031**).

For **claim 1**, Nakayama discloses in a multi-slice network processor system (FIG. 1) comprising a plurality of processing slice modules, each module processing and storing a slice of packet data, a method for processing a packet in packet slices for transfer over a network interface comprising:

assigning a packet identifier (identification filed in IP packet header, line 34 of Col. 4) to the packet;

segmenting data of the packet into cells, the data including both header and body data for the packet (lines 34-35 of Col. 4);

generating cell descriptive information (82 of FIG. 14b) for each cell, the cell descriptive information including the packet identifier, and a packet position indicator indicating an order position of data of the cell with respect to the packet (82 of FIG. 14b; notice that fields in cell header can be used to store the cell descriptive information in any way needed); and

delivering one or more cells of the packet to one or more processing slice modules based upon load balancing criteria (QoS processor, line 56 of Col. 1).

Nakayama **is silent on** prepending a system header to the packet, the system header providing information for use by the multi-slice system;

RFC3031 teaches prepending a label to each packet (lines 1-4 of Section 3.1). The information on how the local system would process the packet is provided via the label (therefore, the label is equivalent to the system header).

Using label has many advantages, including reducing the complexity (first item of Page 4 of Nakayama) of packet processing and flexibility (second item of Page 4 of Nakayama).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use RFC3031 to modify Nakayama to to use label as the system header due to benefit of reducing the complexity of packet processing and performance enhancement.

As to **Claim 2**, Nakayama and RFC3031 in combination disclose the method of claim I, Nakayama further discloses wherein load balancing criteria

includes that no load balancing is in effect (bypass QoS processor in line 56 of Col. 1; or configure QoS processor in a way that it does nothing to traffic).

As to **Claim 3**, Nakayama and RFC3031 in combination disclose the method of claim 1, Nakayama further discloses wherein the packet identifier is a sequence number (identification filed in IP packet header, line 34 of Col. 4) representing an order of the packet in a communications flow and further comprising assigning a communications flow indicator to the cell descriptive information of each cell of the packet.

As to **Claim 4**, Nakayama and RFC3031 in combination disclose the method of claim 1, Nakayama further discloses wherein the cell descriptive information further comprises a slice position indicator (identification filed in IP packet header, line 34 of Col. 4) indicating an order position of the data of the cell with respect to a slice of data of the packet.

As to **Claim 5**, Nakayama and RFC3031 in combination disclose the method of claim 3, Nakayama further discloses the method comprising delivering body data of the packet to one or more of the processing slices ahead of the header data of the packet (out of order is implied by lines 47-48 of Col. 8).

As to **Claim 6**, Nakayama and RFC3031 in combination disclose the method of claim 4, Nakayama further discloses the method comprising:

performing lookup functions for each slice of data (suggested by combination of 80 and 82 in FIG. 14b);

determining a size of data change in header data (suggested by combination of 80 and 82 in FIG. 14b); and

Communicating the size of data change to a queue manager via an indicator in the system header (suggested by combination of 80 and 82 in FIG. 14b).

As to **Claim 7**, Nakayama and RFC3031 in combination disclose the method of claim 4, Nakayama further discloses the method comprising:

storing one or more cells in a buffer in the packet slice (assembly buffers, line 28 of Col. 3).

They **do not explicitly disclose** generating a buffer correlation data structure correlating the buffers of the packet slice.

However, a packet slice is a related group of cells that can be best presented by a data structure such as a link list or a tree. Using data structure link list or tree to present a group of cells/packets is well known to a person skilled in the art (Official Notice).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use data structure link list or tree to present a group of cell due to benefit of simplicity and effective computation.

As to **Claim 8**, Nakayama and RFC3031 in combination disclose the method of claim 7, but **do not explicitly disclose** the method comprising generating a slice correlation data structure based on packet reference pointing to the buffer of the packet slice including the first cell of the packet.

However, in order to effectively manage the slice queue in the assembly buffers, a data structure including reference pointing to the buffer is inherently needed.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use a slice correlation data structure based on packet reference pointing to the buffer due to obvious industry expedient.

As to **Claim 9**, Nakayama and RFC3031 in combination disclose the method of claim 7, Nakayama further discloses further comprising:

maintaining an independent set of upper bits of a sequence number for each communication flow (80 or 82 of FIG. 14b, where VPI or other field can be used to identify each flow); and

They **are silent on** responsive to detecting one of the processing slices delivering a sequence number that is smaller in value than an immediately preceding sequence value for the same slice, incrementing the independent set of upper bits for the respective communication flow, concatenating the set of upper bits with a set of bits of the sequence number into an index, indexing into a re-sequencing buffer space of sufficient depth to cover a slice-to-slice skew case based on the index, and resequencing the packet into its sequence order position.

However, it is obvious to one skilled in the art that sequence number be large enough to present maximum number of sequence. Furthermore, using minimum bits to present a sequence number in order to save precious space in header of the packet/cell is well known and is commonly practiced in the art to reduce overhead and to save bandwidth.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use minimum bits to present a sequence number due to benefit of reducing overhead and saving bandwidth.

As to **Claim 10**, Nakayama and RFC3031 in combination disclose the method of claim 7, Nakayama further discloses further comprising:

generating a slice correlation data structure for the packet including a packet reference pointing to the buffer of the packet slice including the first cell of the packet, and a respective buffer indicator for the buffer in each packet slice storing the first cell in the slice for the packet (a packet is presented by a double link list data structure, which is well known in the art (Official Notice)); and

entering the slice correlation data structure as a single queue entry into a queue (each slice is a node of the double link list).

As to **Claim 11**, Nakayama and RFC3031 in combination disclose the method of claim 7, Nakayama further discloses wherein the network interface is a switch fabric (3 of FIG. 1) and further comprising determining a destination slice across the switch fabric for each packet slice in accordance with load balancing criteria (QoS processor, line 56 of Col. 1).

As to **Claim 12**, Nakayama and RFC3031 in combination disclose the method of claim 11, Nakayama further discloses further comprising:

for a received packet from the switch fabric, storing each cell of each packet slice of the received packet, each cell including descriptive information, in the processing slice identified in a destination slice indicator of the descriptive information (82 of FIG. 14b).

As to **Claim 13**, Nakayama and RFC3031 in combination disclose the method of claim 12, Nakayama further discloses further comprising sending an enqueue message for each packet slice identifying a storage location of the first cell of the slice (22 of FIG. 6).

As to **Claim 14**, Nakayama and RFC3031 in combination disclose the method of claim 13 further comprising:

generating a slice correlation data structure for the packet based upon the storage location, of the first cell of each slice of the packet, and the packet identifier in each cell's descriptive information;

responsive to the size of data having been changed as indicated in the indicator in the system header, determining packet size adjustment; and

entering the slice correlation data structure as a single queue entry into a queue (22 of FIG. 6, reconstruction of a slice).

As to **Claim 15**, Nakayama and RFC3031 in combination disclose the method of claim 13, Nakayama further discloses further comprising:

upon initiation of retrieval of the packet, generating a new packet identifier for the packet;

sending a dequeue message for each slice of the packet;

correlating each cell of the packet into packet form based on cell descriptive information including the packet position indicator and the slice position indicator; and

ordering the packet for transmission to an attached network based on the new packet identifier (OUT-1, FIG. 16, reconstruction of a packet).

For **Claim 16**, it is the corresponding system claim of claim 1, therefore, is rejected for the same reason as explained in claim 1 above.

As to **Claim 17**, it is the corresponding system claim of claim 2, therefore, is rejected for the same reason as explained in claim 2 above.

As to **Claim 18**, Nakayama and RFC3031 in combination disclose the system of claim 16, Nakayama further discloses wherein the network interface is a switch fabric (3 of FIG. 1), and wherein each channel communication interface comprises a port connection with the switch fabric (LI-1 to LI-n of FIG. 1).

As to **Claim 19**, it is the corresponding system claim of claim 14, therefore, is rejected for the same reason as explained in claim 14 above.

As to **Claim 20**, it is the corresponding system claim of claim 15, therefore, is rejected for the same reason as explained in claim 15 above.

As to **Claim 21**, Nakayama and RFC3031 in combination disclose the system of claim 19, Nakayama further discloses wherein the buffer manager comprises an ingress buffer manager (16 of FIG. 2) including an ingress buffer memory space for each processing slice, the ingress buffer memory space for storing cells received from the respective processing slice, and an egress buffer memory space (22 of FIG. 6) for each processing slice, the egress buffer memory space for storing cells received from the switch fabric for each respective processing slice.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jianye Wu whose telephone number is (571)270-1665. The examiner can normally be reached on Monday to Thursday, 8am to 7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on (571)272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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